

DE FOREST PHONOFILM OF CAN-  
ADA LIMITED .....

PLAINTIFF;

1930  
April 30-  
May 1-15.

vs.

FAMOUS PLAYERS CANADIAN COR-  
PORATION, LIMITED .....

DEFENDANT.

1931  
Feb. 13.

*Patents—Infringement—Nullity—Specifications—Vague and ambiguous—  
Subject-matter—Anticipation—Combination*

The patents for invention in question herein are two in number. The first relates to "means for recording and reproducing sound," and in the specification filed with his application for patent in 1923, the patentee describes a "small arc lamp" as the source of light to be used for recording sound on a film photographically. In 1925, in a divided application, he claimed as the light source "an enclosed luminous gas discharge device." At the trial the patentee testified that neither the light from an arc discharge lamp, nor a positive glow lamp, were suitable for his purposes, and claimed that a negative glow lamp alone was suitable. It was contended on behalf of the plaintiff that the light source described in the specification as "a small arc lamp" was a negative glow lamp. The second patent relates to an arrangement for combining sound and picture projecting machines, putting the elements forming the sound head into a separate attachment, or unit, so that it could be easily applied to a standard picture projecting machine. The plaintiff also claimed invention in the sound film gate which guides and presses the film close to the slit as it passes from the film magazine, preventing lateral movement which would be fatal.

*Held* that where the specification uses language which, when fairly read, is avoidably obscure or ambiguous, the patent is void, whether the defect be due to design, or to carelessness, or to want of skill; nothing can excuse the use of ambiguous language when simple language may easily be employed, due allowance, of course, being made where the invention is difficult to explain.

2. Where the terms of a specification are so ambiguous that its proper construction must always remain a matter of doubt, it is the duty of the Court to declare the patent void.
3. Specifications must be read in their ordinary and natural sense, though it may sometimes happen that in construing the same the Court may be justified in understanding the language not according to its ordin-

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ary meaning but in the way in which it would be understood by skilled workmen. Such specifications, moreover, must be intelligent to ordinary workmen possessing that degree of skill, intelligence and knowledge fairly to be expected of them in respect of that branch of the useful arts to which the invention relates, and they are not required to possess that great skill, scientific knowledge or power of invention, which would enable them by themselves to supplement a defective description or correct an erroneous description.

4. Where a specification contains various statements calculated to mislead persons to whom it is addressed, or renders it difficult for them without trial or experiment to comprehend in what manner the invention is to be performed, the specification is bad.
5. Moreover, where a specification describes two things, one practicable and the other impracticable, or where it directs two alternative ways of constructing or using an invention and one is impracticable or useless, the patent is bad.
6. The patentee must make it perfectly clear what it is he claims as his monopoly; the public are entitled to know at once what it is, by reason of the patent, they are excluded from doing. If he describes something not new, it must distinguish that which is old from that which is new and claim the latter only; if claim is made to anything which is old, the specification will be bad and the patent void on the ground that the patentee has claimed something lacking the essential feature of novelty.
7. That the patentee in his present specification having chosen to designate as his light source an arc lamp, there being such a lamp, now not claimed as his invention, and failing to mention by its well known name the useful negative glow lamp, now claimed as his invention, and having failed to describe the latter even in general terms so that those to whom the specification was addressed might readily recognize the invention as a negative glow lamp and nothing else, his specification fails in this to comply with the requirements of the law, is too vague, indefinite and misleading and the patent is in consequence null and void.
8. That uncertainties and deficiencies in the specification cannot be amended or explained away years afterwards when the same is questioned in an action, and the patented lamp being capable of being used either as a glow lamp, or as an arc discharge lamp, according to the pressure of gas and other conditions, and the patentee not having directed the exclusive use of the lamp as a glow lamp and not having explained that an arc discharge light was unsuitable and how it could be avoided, the specification is for this reason also bad, and the patent void.
9. Persons to whom the specification is addressed are not expected to possess that skill and knowledge, or to perform that amount of experimental work which would enable them to ascertain the one source of light which would be suitable for the purpose of recording sound on a film, or to ascertain that the other light was unsuitable for the purpose.
10. That as regards the second patent there was no ingenuity of invention in making a separate unit of the sound head to be easily applied to the picture head.
11. At trial, it was claimed that there was invention in the sound film-gate, one of the elements of the sound head combination. *Held*, that in a combination patent particularly if invention is claimed for any

integer in the combination it must be described and claimed as new, and clearly claimed, otherwise the invention can only be in the combination, if at all. That, moreover, the film-gate being known, there was no invention in selecting one way of a score of slightly different ways which would easily suggest themselves to anyone skilled in the art.

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ACTION by the plaintiff, as assignees of Dr. Lee de Forest, to have it declared that Canadian Patents for Invention Numbered 252,491 and 279,863, are valid and infringed by the defendant. The defendant denied that it was infringing plaintiff's patents, and that, even if it was found that the device used by it was an infringement of the said patents, it had perfect right to use it, inasmuch as the plaintiff's said patents were null and void for the reasons mentioned in the reasons for judgment printed below.

The action was tried before the Honourable Mr. Justice Maclean, President of the Court, at Ottawa.

*H. N. Chauvin, K.C.*, and *Frank Chauvin* for the plaintiff.

*O. M. Biggar, K.C.*, *R. S. Smart, K.C.*, and *O. S. Tyndale, K.C.*, for the defendant.

The facts material and the questions of law raised are stated in the reasons for judgment.

THE PRESIDENT now (February 13, 1931), delivered judgment.

The plaintiff in this action claimed infringement, by the defendant, of eight different patents; at the beginning of the trial the plaintiff abandoned his action in respect of six of the eight patents and proceeded to trial upon the remaining two patents. The first to consider is patent no. 252,491 which issued to Lee de Forest, the plaintiff's patentee, on August 11, 1925, upon an application dated April 24, 1923, and relates to "Means for Recording and Reproducing Sound". The alleged invention was directed to subject matter already described in a former application for patent made by de Forest in October, 1920, and from which the subject matter of the patent in question was divided; further reference will shortly be made to this application. The other patent in suit is no. 279,863, which issued on May 1, 1928, upon the application of the same

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patentee, Lee de Forest, dated the 24th of April, 1923, and it relates to "Talking Moving Picture Attachments."

Adverting now to the first mentioned patent no. 252,491. The patentee states that one of the objects of his invention was the provision of electrically controlled means for photographically recording sound. The specification refers to the co-pending application as follows:—

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In my co-pending application from which the subject matter of this present case is divided, I have shown and described means for recording sound waves upon a photographic film such as an ordinary film employed in motion picture photography, and I have therein set forth and described that a source of light may be directly controlled in the intensity, pitch and volume of sound in such a manner that the fluctuations caused by sound waves in the intensity of light emitted from the source may be photographed upon the film.

The patentee describing his invention states:—

In accordance with my present invention, I employ a small arc lamp 52, preferably consisting of two heavy tungsten ball electrodes 50 and 51, separated by a small gap, for example, 0.5 millimeters, mounted in the small vessel 52, either evacuated or filled with some gas, such as nitrogen, mercury vapour, etc., to make the light from such arc as rich as possible in ultra violet rays. The light rays from the arc lamp pass through the lens 3 in the usual well-known manner and in addition thereto, if desired, through a colour filter 4, which colour filter is preferably of a dark blue, as I have found that the best results of recording sound waves photographically are thus secured. A photographic film 7 is passed by the lens and film 3 and 4 respectively in the usual well-known manner and the light emanating from the lamp is recorded on the film, preferably in the nature of a minute ray obtained from a pin point aperture or focused to a point by a lens. I energize the arc lamp 52 from a source of high frequency current, the frequency of which must be well above the audible limits and modulate the high frequency currents supplied the arc lamp with alternating or pulsating currents set up by and in accordance with sound waves.

Then follows a description of what is said to be a well known form of high frequency generation circuit and which need not be repeated. He then proceeds:—

The alternating or pulsating currents produced by the microphone 5, which is included in circuit with a current source 6 and one coil 17 of a transformer, the other coil 18 of which is included in the input circuit of an audion amplifier 90 and thus amplified are supplied by the output circuit of the audion amplifier 90 to the transformer coil 91 included therein, and thence to the transformer coil 92 included in the grid filament circuit of the oscillion 60, thereby affecting a modulation of the high frequency oscillations generated by the balance of the oscillion systems, and the modulated high frequency oscillations vary the degree of brilliancy of light emitted from the arc light by the unmodulated high frequency currents, which variations are proportional in every respect to the original modulating audible frequency alternating or pulsating currents in the microphone circuit.

Claim 7 which is typical of all other claims relied upon is as follows:—

Means for photographically recording sound waves comprising an enclosed luminous gas discharge device, means for constantly maintaining said device effectively luminous, and means for varying the luminosity of said device by and in accordance with sound waves, and means for directing the light from said device to a sensitized element.

I might at once state that the invention claimed to be infringed relates only to the light source or lamp, a small arc lamp, as described in the specification. A very considerable amount of evidence was taken in the case, and there are so many matters of fact in dispute, that it becomes necessary to discuss the case at some length.

As already stated, de Forest made application in Canada for letters patent on October 29, 1920, which included the subject matter of the patent in suit. The corresponding application was made in the United States in September, 1919. The subject of this invention was stated to be "Means for Recording and Reproducing Sound." The specification states:—

It is among the special purposes of my present invention to record sound waves upon a photographic film such as an ordinary film employed in motion picture photography. This can be accomplished in many ways. I have discovered, however, that a source of light may be directly controlled by the intensity, pitch and volume of sound in such a manner that the fluctuations caused by sound waves in the intensity of light, emitted from the source may be photographed upon the film. My investigations have revealed that certain light cells are more sensitive to the ultra violet rays of the spectrum than others.

It also states:—

The invention consists substantially in the construction, combination, location and relative arrangements of parts, all as will be more fully hereinafter set forth, as shown by the accompanying drawing and finally pointed out in the appended claims.

In the application de Forest described two light sources, one being a small incandescent filament lamp. Referring to this lamp he stated:—

It is highly important that the filament should be as small as possible and that every facility for conducting the heat away from the filament should be provided. I prefer therefore to use nitrogen, or other gas filled lamp to a high vacuum lamp . . . Moreover, the light from a nitrogen filled lamp is much richer in violet and ultra violet rays which most actively affect both the photographic film, and the photo-electric cell.

He then proceeds to describe the second source of light in the following language.

In place of the above described incandescent lamp method of controlling by sound waves the light intensity, I may use a small arc lamp as shown in fig. 6. Such lamp preferably consists of two heavy tungsten

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ball electrodes 50 and 51, separated by a small gap, for example, 0.5 millimeters, mounted in a small glass vessel 52, either evacuated or filled with some gas such as nitrogen, mercury vapour, etc., to make the light from such arc as rich as possible, in ultra violet rays.

At the instance of the Commissioner of Patents it was directed that the application be limited to one of the two described sources of light, so as to comply with a Rule of the Patent Office restricting any application for patent to one invention only; this was the reason, or one reason, assigned to me at the trial for the division of the application, but upon an examination of the Record File, I was unable to find any record of such a direction.

Upon the original application a patent issued on July 14, 1925, and in this patent the light source to be employed was described as a small incandescent filament lamp. A fresh application for patent was filed on April 24, 1923, wherein the light source to be employed was described as "small arc lamp". A patent issued upon this application on August 11, 1925, and is this patent which is presently under consideration. It is to be observed that the specification of the latter patent, in so far as the description of the light source is concerned, is practically as it appeared in the original application; however, subsequent to the application new claims were added, among them being claims 7, 8, 9 and 10, the first of which I have already quoted, and these are the claims now solely relied upon by the plaintiff. The important feature of the new claims is that the light source, the small arc lamp, mentioned in the specification, is for the first time claimed as "an enclosed luminous gas discharge device." These new claims, I was informed, were submitted by way of amendment only in May, 1925, five years after the date of the original application and about two years after the date of application for the patent in question.

I have already quoted at some length from the two specifications, de Forest's description of his invention presently under discussion. Upon the trial he gave evidence further explanatory of his invention and its operation, and evidence of the same nature was also given by Mr. Dyer on behalf of the plaintiff. It may be useful to refer to certain portions of this evidence, reserving until later any comments in respect of the same. Dr. de Forest stated that at the time he conceived the invention in question, in

1918, he had under consideration three methods of recording sound photographically on a motion picture film. He had considered recording the fluctuations of a gas flame, and also the light fluctuations from a fine incandescent filament lamp, in an envelope filled with some rapidly cooling gas, like nitrogen or hydrogen. The third method was the following as explained by de Forest:

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The third method, the one that is disclosed in this patent, was to use a glow lamp, a lamp in which the electrodes were close together, a glass vessel containing two electrodes close together, partially filled with a gas, the light from which when illuminated by the passage of electricity between the electrodes should be highly actinic, have a high photographic value, rich in violet and ultra-violet rays.

Being asked to explain under what conditions his invention would most successfully function he stated:—

The electrodes should be near together, first of all. The glow should be confined to the juxtaposed surfaces. The negative glow should be used entirely. The gas pressure should be somewhere between .8 millimeter and 7 millimeters of mercury pressure. The gas must contain a good proportion of nitrogen. I have found that a mixture of 80 per cent nitrogen and 20 per cent argon is the best combination. The electrodes should be of material which does not easily disintegrate under the ionic bombardment. I am not speaking of the rapid disintegration which takes place when a hot arc passes, but even in the true glow discharge there is a certain slow disintegration of the anode or the cathode material, and for that purpose we prefer to use tantanium or molybdenium as the cathode material. Tungsten is very good for the purpose also, etc.

Explaining the construction of the lamp de Forest stated:

The vessel 52 is filled with a suitable gas, for example nitrogen or argon or a mixture of the two, and partially exhausted until an electrical discharge can pass between the two electrodes. When such electrical discharge passes between the electrodes, the gas in between becomes luminous. When you look at this device you will see that both balls are covered with a soft velvety light, which is more intense in the space between the electrodes. The brilliancy of this light depends upon the current passing. This light is known in physics as the negative glow. The useful light for photographing sound waves is always the negative glow, in other words the light which surrounds the negative electrodes, and is distinguished from the positive glow.

With lamps such as I use and such as the defendant uses, the negative glow is the only light which is visible while the electrodes are close together. If the electrodes are separated a long distance we have the negative glow surrounding the negative electrode, and also a positive glow.

Dr. de Forest further explained the preparation of his lamp in the following language:—

First the tube is exhausted of air. Then the tube is filled with nitrogen, argon, or whatever gas combination is to be used, at atmospheric pressure. Then the pump is set to work, and the pressure of the gas in the tube is greatly reduced. At this stage of the process the electric

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potential which is to be used with the tube in actual practice, say 450 or 500 volts, is connected to the terminals of the tube. The exhaustion process then continues until the tube lights up, due to the passage of electrical current between the electrodes. The exhaustion process is continued until the tube is illuminated to its maximum.

Being asked by counsel for plaintiff to explain what was new in the lamp described in his specification, he stated:—

Glow tubes of various sorts, Geissler tubes they were usually called, are very old in the electrical art; but prior to my invention no one had used or described or constructed a glow tube where the electrodes were close together, the tube filled with a partially exhausted nitrogen gas for the purpose of photographically recording the fluctuations of such a light. It was only by virtue of the fact that the electrodes were close together and the negative glow therefore being the only glow to consider, that this device became useful as a sound recording element.

Mr. Dyer, one of the plaintiff's expert witnesses, explaining the invention stated:—

Now when Dr. de Forest showed this glow light, in my opinion it would be perfectly obvious that it was intended to be operated with a cathode glow. It was known perfectly well that the cathode glow could be increased and enlarged by very substantially reducing the pressure; . . . . But there is another way to increase the cathode glow effect or in other words to suppress the positive column, and that is to put the electrodes very close together, so that there is not any room for a positive column. And that is what Dr. de Forest has done; so that he has made this lamp with the electrodes so close together that we have only a negative glow.

He also stated:—

The light which is described in patent no. 1 (the patent in question) is a glow lamp. Such lights have been known for 70 or 75 years. They have been the subject of much investigation, and large books have been written about them. . . .

Because these things were old and well known, and, as I have said to your Lordship, large books have been written on the subject; and people know that every gas has its own colour and every gas has its own conducting pressure, and that you cannot get a glow unless you make that pressure within the limits through which the current will pass.

It might not be inappropriate here to explain that in practice there are two general methods of recording sound in connection with the production of sound motion pictures; in one method the sound is recorded on a wax disc similar to the well known phonograph record, in the other method the sound is photographed on a standard motion picture film. In either of these methods, the sounds are translated into electrical energy by means of the microphone and these sounds now in the form of electrical variations are amplified through several stages of vacuum tube amplifiers to the degree necessary to actu-



ate the recording means. In recording sound upon a standard motion picture film the amplified sound in the form of electrical variations is changed into light variations, that is to say, a light source or lamp appearing in the electrical circuit is modulated or fluctuated in intensity according to the variations of the electric current from the microphone; thus the intensity of the light is modulated or controlled in exact accordance with the sound waves which fall on the microphone. These variations are transmitted through an aperture or light gate upon a film which is passing before the aperture or light gate. The negative when developed will disclose a sound record on the film. Different methods are employed in conducting the light variations to the film. There is the constant light, that used by the plaintiff and also by the defendant, the brilliancy of which can be directly modulated, as I have explained, by electrical energy. In some cases a light valve or light gate is interposed between the source of light and the film, and the amount of light it allows to pass through, and the frequency of the variations in this light, is a function of the valve. Then there is the rotating mirror method employed, I understand, by the Radio Corporation of America, but I need not explain this; I believe there are other methods. There are, as I understand it, two principal methods of recording the sound upon a film by means of light variations. In one method the record is comprised of lines varying in density or darkness and occupying the full width of the sound track, that is, they are of uniform amplitude, the record being produced by the admission of light to the film in the degree of intensity determined by the loudness of the sound; this is known as the variable density method and it is one of the chief characteristics attributed by the plaintiff to sound films produced by the de Forest invention under discussion, and it is also said to be characteristic of the infringing device. The other method is known as the variable amplitude or variable area method; here the recording is of the zigzag form, the loudest sounds or vibrations recorded occupying the whole width of the sound track, while vibrations of lesser amplitude are recorded in narrower and varying lines. The number

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of bands or lines in the variable density record, and the number of irregular lines or peaks in the variable area method, is, I believe, proportional to the frequency.

Much was said in this case about arc lamps and glow lamps, and in fact this case turns largely upon whether the specification was intended to describe and direct the use of an arc discharge lamp or a negative glow lamp, and therefore a brief reference to arc lamps and glow lamps is unavoidable. The ordinary open arc lamp, with which the lay public was at one time more familiar than at present, is an electrical apparatus in which two electrodes, a negative and a positive, usually of carbon, are struck together and then automatically separated by a short distance, thereby establishing an arc which gives a brilliant illumination; an arc lamp may however, be closed, it may be filled with gas, and the composition of the electrodes may be other than carbon. The chief characteristic of an arc lamp when used as such, is, that, in operation a substantial current is necessary for its maintenance and most of the light emitted from the electrodes—ninety per cent it is said—is due to the fact that the electrodes are incandescent. Owing therefore to the high temperatures prevailing in an arc lamp, it is necessary that the electrodes which are placed closely together be of a material with a high melting point, if the melting point be low the electrodes would rapidly burn away. An electric arc lamp, it is agreed, if operated as such, is not satisfactory for recording sound photographically, because the arc flame is bright and rigid and does not modulate or respond so readily to high frequency changes in current fluctuations, as does a glow lamp, which I shall early describe. The light from the incandescent electrodes shows little of the far blue and ultra violet end of the spectrum, and for this reason it is not rich in actinic properties, which is a distinguishing feature of some glow lamps.

Glow lamps, or glow discharge lamps as they are frequently called, are usually of the same type, but are recognized under two different conditions; in one case the light comes from the negative glow and in the other from the positive glow or positive column. Generally a glow lamp consists of a glass enclosure containing two electrodes and filled to the required degree with a gas such as nitro-

gen, argon, helium, etc., or a mixture of gases. On a difference of potential being applied to the electrodes, a suitable gas being used and a low gas pressure being employed, an electrical discharge passes between the electrodes. The gases being thus excited electrically, a soft velvety light appears near or around the cathode which is the negative electrode; this light is known in physics as the negative glow and always appears close to the cathode, the glow arises in the gas itself. The negative glow is rich in the ultra-violet rays, or, as it is said, is rich in actinic properties; the most desirable light for photographically recording sound is always the negative glow light. If the envelope between the cathode and the anode or positive electrode is constricted in any way, or if the electrodes are widely separated, then a different luminosity develops in that section near the anode end of the tube. This is called the positive column, and is distinctly brighter and distinguishable in appearance from the negative glow. In a dumb-bell shaped tube, constructed with two small glass bulbs with a short piece of glass tube between them, both electrodes in the bulb ends would show a negative glow with an alternating current, but only at one electrode on a direct current, and the positive column would appear in the constricted tube between the bulb ends. With both electrodes substantially spaced in the same shell or envelope, and with an alternating high frequency current, the negative glow would alternately show at either electrode, and practically nothing of the positive column would be shown, but with a direct current the negative glow would only appear around the cathode, and the positive glow would appear between the cathode and the anode. If the electrodes are placed closely together, say five to ten millimeters, only the negative glow would appear either on an alternating current or a direct current, but apparently in practice the direct current only is necessary and therefore the most desirable. It is to be remembered that it is one of the claims of the plaintiff, made in support of its patent, that where the electrodes are placed closely together in a gas filled lamp, only the negative glow appears, and that the placing of the electrodes closely together in a gas filled lamp was the invention made by de Forest. Briefly, in the case of a glow lamp, the use of certain gases

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is essential and not optional; a relatively low gas pressure is necessary; the light comes substantially from the gas and not from the electrodes as in an arc lamp; the electrodes are heated but not substantially, the heat being in the gas; the temperature is low; the current necessary to maintain a glow lamp is comparatively small with that required to maintain an arc lamp; the negative glow is rich in violet and ultra violet rays and therefore possesses a high actinic or photographic value. It is common ground that the positive column is unsuitable for photographically recording sound upon a film.

The phenomenon of the negative glow and the positive glow was explained by some of the expert witnesses and possibly I should briefly refer to this in further detail, in order to indicate in a general way the origin of each, the distinction between them, and also because it may assist in a proper appreciation of just what it is that is here claimed as the invention. I shall have particular reference to the evidence of Dr. Johnson upon this point. In the case of glow discharge lamps the electrical current is conducted to the gas by electrons and by positive ions, and the glow phenomenon arises in the gas itself. Some of the electrons come from the cathode, the negative electrode, and they gain such velocity that when they strike an atom in the gas, the atom is broken up into an electron and a residuary part of the atom which is known as a positive ion. These new electrons again collide with other atoms, and thus a great many atoms in the gas are broken up into electrons and ions which assist in the conduction of the current. Some of these electrons and ions recombine again, because they attract each other and form in atom and in that reformation of the atom a light is emitted, a certain electrical resonance is set up in the atom which gives rise to the emission of light, and this gives the glow phenomenon which arises in the gas itself. Further it was explained that the electrons which leave the cathode require to pass through a certain space before gaining sufficient velocity to ionise the atoms, that is to break up the atoms, and in that space there are few ions and very little reformation of atoms and consequently no light. That space is a thin layer near the cathode, from which little light comes, and this is called the cathode dark space, or Crooks

dark space. It is beyond that dark space, ordinarily half a millimeter wide in ordinary discharges, where the electrons from the cathode strike the atoms of gas and new electrons and ions are made, and their reformation as explained makes what is called the negative glow—described as a sheaf of luminosity—surrounding the cathode and separated from it only by the dark space. This glow or luminosity extends to a limited distance in the direction of the sides of the tubes and beyond that there is another dark space, known as the Faraday dark space, in which the electrons travel slowly. Beyond that dark space will appear the positive column—so called because when first observed it was in a long tube and resembled a column—at the anode end of the lamp, depending much, as I have already explained on the shape and construction of the lamp, whether an alternating or direct current is used, and the separation of the electrodes. Near the anode end of the tube, the speed of the electrons is still fairly low, the conductivity of the gas is high and the electrons do not so much break up the atoms into electrons and ions as they do in the negative glow, but they simply disturb the electrons in their orbits around the atom, and that disturbance sets up a resonance which is emitted as light in the positive glow, and the larger part of the light in the positive glow is emitted in that way. All this, of course, was long well known to physicists. It will be observed that the negative glow is always a cathode glow and the positive glow appears apart from the negative glow. The spectroscopic difference is that the positive column is rich in the red and yellow end of the spectrum, and the negative glow is rich in the blue end of the spectrum. In the Neon street signs, it is the positive column that is used. The tubes carrying the electrodes are concealed behind the signs and the only light seen is the positive column. As I have already made clear, what is claimed as the invention of de Forest, is that he was able to exclude, by the particular construction of his lamp, the undesirable positive column by placing the electrodes so closely together that there was room only for the negative glow, the desirable light for sound photography.

For more than one reason it is perhaps desirable that I should describe the infringing lamp, known as the A.E.O.

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lamp, and also explain its origin and development. The A.E.O. lamp was produced originally by Case Research Laboratory Inc. of the State of New York; later, in 1926, I understand this concern became associated with the Fox Company of New York, and the combined concerns became and are known as the Fox-Case Company, and are, I think, now the makers of the infringing lamp. Early in November, 1922, de Forest was using in his experimental work a dumb-bell type of lamp, a lamp having the positive column and working on fairly high voltages; he had used the same lamp in the previous January. On or about March 11, 1922, de Forest approached T. W. Case and informed him that he was having trouble with his lamp, in its going out on modulation, and sought his assistance in overcoming this difficulty; they had business relations prior to this in connection with a thallified cell produced by Case. Concerning this incident Case states in his evidence:

Thinking the matter over it occurred to me that if we wanted a low voltage tube we would have to use something on the electrodes which would facilitate the discharge. I had happened to make, in the invisible secret signalling apparatus, some tubes that we used in a peculiar circuit, which had an oxide coated filament on them. These tubes worked with the filament hot, and they had also worked with the filament cold, at relatively low voltages, that is I mean 100 to 200 volts. I had some of these tubes in the drawer, they were designed to work in a circuit to produce an audio frequency discharge. As they were doing that they had a glow in the tube. They were filled with argon gas. It occurred to me that these worked on such a low voltage that we might possibly be able to use something like that for a light which you could modulate easily on low voltages. That was part of the idea . . . I loaned the two I had, and then we started to make more of them experimentally, and tried to find out how to make them so that we could work up to where we would get the same light intensity and same results out of them. . . . Commercial results I mean, something that would really take the film above the level of the ground noises and would be a commercially practicable thing.

The invisible signal apparatus referred to by Case was used by him while in the United States Naval Service during the war. The glow mentioned by Case as showing in his tube was, I understand, a negative glow. By the early part of 1923 Case had developed his first tube or lamp of the A.E.O. type. Explaining the principal characteristics of the A.E.O. tube, Case stated:—

To get light from this tube nitrogen is the very best thing you can use. Now nitrogen is a gas which is a very poor conductor of heat. If you use nothing but nitrogen your cathode, if it is small, will heat up, and you will come into an arc discharge. Therefore you

must use a gas in there together with the nitrogen, which is a good conductor of heat. Therefore we used helium as the only gas we could find to put in with the nitrogen so as to take the heat away fast enough so that it would not go into an arc discharge . . . . The form of electrode is merely one which is about the only form we can use and coat with oxide material in the way in which we want it. . . . The oxide material in the present light is a photo-active material. I believe that is the reason that we get the high frequency from our A.E.O. lights that you do not get from a light that is not photo-active. I have never heard of an uncoated electrode that has the balance at high frequency compared to low that is not photo-active.

Case, I should state, had been interested for many years in the photography of sound, and had also for several years been engaged in research work on light reactive materials. It is agreed that the oxide coated electrode has utility. The evidence indicates that early in 1923 de Forest, having got Case's lamp, made sound film records with it, and the same were publicly exhibited. It was stated and not contradicted, that de Forest was using the Case lamp at the date of his application for the patent in question, and that he continued its use until some disagreement took place between Case and himself, when, it is claimed, de Forest adopted the use of the Tri-Ergon lamp, a German lamp. I should perhaps proceed a little further in my description of the infringing lamp. The gas pressure used in the A.E.O. lamp is close to 20 millimeters, the percentage of helium used is about 97 per cent and of nitrogen about 3 per cent, it does not employ heavy tungsten ball electrodes but uses a hairpin filament for the cathode and a plate spaced away from the anode, one of the electrodes is coated with barium nitrate, the electrodes are separated by four or five millimeters, and it is operated by a direct current and not by a high frequency current. Such are the chief characteristics of the infringing lamp and the history of its appearance in this litigation.

The validity of the plaintiff's patent is questioned upon several grounds. The point most strenuously contested upon trial was whether the specification, which states the light source to be "a small arc lamp," describes or directs the use of a negative glow lamp. The defendant contends that the specification describes and was only intended to describe an arc lamp, which it is claimed is a source of light different from a negative glow lamp, or any luminous gas discharge device; that if it was in-

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tended to describe a light source functioning as a negative glow lamp, the specification is void for want of sufficient description and for lack of directions as to the construction and operation of such a lamp, and that consequently the specification does not fulfill, in that respect, the statutory requirements; that the specification is ambiguous and therefore bad; that the specification directs the use of the lamp either "evacuated," or "filled with some gas" and as the first alternative is impracticable, the patent is void; that the plaintiff's lamp may be used as an arc discharge lamp which for the purposes of this case admittedly lacks utility, or it may be used as a negative glow lamp, depending upon the pressure of gas and other conditions, and as the specification gives no directions how to obtain the one or avoid the other, without an unreasonable amount of experimental or research work, the patent is bad; that the claims relied upon are void because they include something not mentioned or described in the specification, an enclosed luminous gas discharge device, and because such claims are so wide as to include other known enclosed luminous gas discharge devices, and consequently there has been anticipation of any device so widely claimed. It is also claimed that at the most the plaintiff's invention relates only to some particular new method of applying a well known principle, and if there be invention it is only for an improved method of attaining an old object, and that there has been no infringement because the defendant has not used the plaintiff's method, but another and different method. Again the defendant contends that it has not infringed the plaintiff's patent because it has not used the plaintiff's lamp, but has at the most used a positive film printed from a negative film made in the United States by a third party, in the production of which the plaintiff's lamp was used, and the plaintiff's patent does not purport to claim, and cannot in law claim, invention in the product of that lamp; it may not be necessary to consider this last point but I think it should be mentioned.

This might be a convenient stage at which to state briefly the legal principles that have been laid down, and gener-



ally accepted, relative to the construction of the specification of a patent. The specification must "clearly and fully describe the invention and its operation or use as contemplated by the inventor" and it must "set forth clearly the various steps in . . . the method of constructing the machine, manufacture, etc." This was an obligation of the Common Law and it is now an obligation by Statute. If the specification uses language which when fairly read, is avoidably obscure or ambiguous, the patent is void, whether the defect be due to design, or to carelessness, or to want of skill; nothing can excuse the use of ambiguous language when simple language may easily be employed, due allowance of course, being made where the invention is difficult to explain and there is a resulting difficulty in the language. If the terms of a specification are so ambiguous that its proper construction must always remain a matter of doubt, it is the duty of the Court to declare the patent void. The specification must be read in its ordinary and natural sense, though it may sometimes happen that in construing a specification the Court may be justified in understanding the language not according to its ordinary meaning, but in the way in which it would be understood by skilled workmen called upon to act according to its directions. The specification must be intelligent to ordinary workmen possessing that degree of skill, intelligence and knowledge fairly to be expected of them in respect of that branch of the useful arts to which the invention relates; and while the specification is not addressed to people who are ignorant of the subject matter, yet they are not required to possess that great skill, scientific knowledge or power of invention, which would enable them by themselves, unaided, to supplement a defective description or correct an erroneous description, but this of course would not be applicable to slight defects and errors which any workman of ordinary skill and experience would perceive and correct. A specification also is bad, if it contains statements calculated to mislead the persons to whom it is addressed, or if it renders it difficult for them without trial and experiment to comprehend in what manner the patentee intends his invention to be performed. If a person of skill is to come in, and by means of his skill and experience without experiment is to correct mistakes or supply important omissions in a specification,

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or decides that the directions of the specifications are not to be followed, then the specification is bad because it has not in reality given any useful or valuable information to the public. Further, if a specification describes two things, one practicable and the other impracticable, or if it directs two alternative ways of constructing or using an invention and one is impracticable or useless, the patent is bad, and if a skilled workman would know the impracticable thing or the useless alternative which could not be acted upon, and so would confine himself to the other, that would not warrant giving effect to the specification, because that would not be to construe a specification according to the language of the workman instead of according to our ordinary language, but to reject something claimed by the patentee, because a workman would know that it was an impractical direction or claim. The patentee must make it perfectly clear what it is he claims as his monopoly; the public are entitled to know at once what it is by reason of the patent they are excluded from doing. If a specification describes anything which is not new, it must distinguish that which is old from that which is new, and claim only the latter; if claim is made to anything which is old, the specification will be bad and the patent void, on the ground that the patentee has claimed something which lacks the essential feature of novelty. All this will be found in practically the same words in the following authorities: *Simpson v. Holliday* (1); *Beard v. Egerton* (2); *Natural Colour Kinematograph Co. v. Biochemes* (3); *Neilson's Patent (Neilson v. Harford)* (4); *Plimpton v. Malcolmson* (5); *Parke B. in Neilson's Patent* (6); *French Complex Ore Reduction Co. v. Electrolytic Zinc Process Co.* (7).

Whether the specification of de Forest discloses the invention it is claimed he made, that is, a negative glow lamp, and whether the same is sufficiently described in his specification may first be considered. The question for determination is not whether the plaintiff's lamp under certain conditions might not function as a negative glow lamp, it is whether

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| (1) (1866) L.R. 1 E. & I. App. 315. | (4) (1841) 1 W.P.C. 331, at p. 341.  |
| (2) (1847) 2 C. & K. 667.           | (5) (1876) L.R. 3 Ch. D. 531, 568.   |
| (3) (1915) 32 R.P.C. 256.           | (6) (1841) 1 W.P.C. at pp. 314, 315. |
|                                     | (7) (1930) S.C.R. 462.               |

the specification sufficiently describes and directs the use of a negative glow light as a light source, in the recording of sound upon a film, and whether it sufficiently sets forth the various steps in the construction or manufacture of a negative glow lamp and its operation or use. It was admitted by de Forest that neither the light from an arc discharge nor a positive glow were suitable for attaining the object of his alleged invention, and that a negative glow light alone was useful; he must therefore be taken to mean, and it is in fact so contended, that in his specification he did describe as his invention, a negative glow lamp, its method of construction and its operation or use. There is a vital distinction between these several mentioned lights, and de Forest was aware of the distinctive characteristics of each, at the time of his alleged invention. It was, de Forest stated, because, in a glow lamp, he had placed the electrodes so closely together in a gas filled lamp that the negative glow became the only light to consider,—the positive glow being suppressed by this construction—and that for this reason his lamp was new and useful as a sound recording light source. Now if that was the intention, it would appear to me, that nothing could conceivably be easier than for de Forest to describe with clarity and in very specific terms in his specification, as he did years later in his evidence in this action, the nature of the light source he had discovered as being new and useful in the photography of sound, the light source he alleges to have ultimately selected in preference to a gas flame, or a fine incandescent lamp filament, both of which he says he had considered and abandoned in favour of a negative glow lamp. There was no occasion, it seems to me, for ambiguous or uncertain language, in expressing a description of the invention and its method of construction, upon the ground that the invention was difficult to explain, for it was not difficult to explain. Nor was there any difficulty in setting forth in plain language all the directions reasonably necessary to the successful operation of the alleged invention.

Let us now examine the language of the specification which states, "I employ a small arc lamp"; gas may be used to "make the light from such arc as rich as possible in ultra violet rays." We find many references in the specification to an arc lamp, and the light from an arc

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lamp, and there is no suggestion in terms of any other lamp, or a light from any other lamp. Several of the claims in the application for patent, but not those relied upon in this action, speak of "an electrically lighted lamp." It is to be assumed that de Forest knew as much about his invention in 1920, when it is claimed it was first described in a specification, as he did at the date of the trial of this action; any new methods of using his small arc lamp, or any new and useful ends to which it might be applied, since discovered or invented, cannot be relied upon to support the invention with which he entered the Patent Office in 1920; he must leave the Patent Office with nothing more than the invention which he brought there, and as described in his specification. Now, if de Forest chose to designate as his light source an arc lamp, there being such a lamp and ordinarily characterized by the incandescence of the electrodes, but which lamp he now says was not useful for his purposes and was not his invention: if he fails to mention by its well known name the useful lamp, which he says was his invention,—a glow lamp showing the negative glow only—and if he fails to describe it even in general terms so that those to whom the specification was addressed might readily recognize the invention as a negative glow lamp and nothing else, then, it seems to me the patentee is confronted at the start with the very formidable challenge that he has failed to describe properly and sufficiently his invention. There can be no justification for reading this specification otherwise than in its natural and ordinary sense. It is not a case, I think, where it becomes necessary to enquire what meaning the skilled workman would attach to the specification. If there be any doubt as to the meaning of the specification, the patentee must suffer the consequences of a doubtful or ambiguous specification, even if such defects were altogether innocent. It seems to me that there is doubt in this case as to the meaning of the specification, because, if for no other reason, the patentee describes the source of light as "a small arc lamp," and that is now claimed to mean and to be "a negative glow lamp," another and well known source of light, and long known as such it is admitted by the plaintiff. The entire absence of reference to, or description of, a negative glow lamp or an enclosed luminous gas discharge lamp or

device, the thing which de Forest says he invented, and the failure to plainly direct the use of a negative glow light as a source of light, is I think, fatal to the patent. If the term "arc lamp" was at the time of the alleged invention so used as to comprehend a positive glow lamp, a mercury vapour lamp, and possibly various other sources of light, as is claimed by de Forest, then clearly it was all the more necessary to designate by name, or to reveal in general terms at least, the negative glow lamp, not only that the invention might very definitely be known to others, but because a negative glow light was different from some other light sources falling, it is alleged by the plaintiff, within the popular designation of "arc lamps", but none of which were suitable for the purposes which de Forest had in mind. I have already explained that a glow lamp is one in which the light comes chiefly from the gas therein contained and which is excited electrically, and not from the electrodes. Dyer stated in his evidence, as also did de Forest, that glow lamps were old and well known as such, and the former testified that much had been written concerning them in the past half century or more, but all that is a very good reason why such a lamp should be named and described in an application for a patent, if its selection or construction constituted an invention, and also because it is imperative that the public have a clear understanding of the monopoly claimed. The phenomenon of the glow light doubtless was long since known, and also the distinction between the negative glow and the positive glow, but in truth to a very limited circle, nevertheless the negative glow lamp was not so old or well known in its application to the photography of sound; the use of any source of light for recording sound photographically was a comparatively new art, and that would be a reason why the particular light source claimed here as an invention should have been designated by its well known name, or at least should have been so generally described as to be at once recognizable as a negative glow lamp, and distinguishable from other lamps with which it might popularly be confused. That which was and is known as a glow light, either negative or positive, was never confused, in my opinion, with any other light source, and there is no satisfactory evidence supporting such a contention. If one looked to

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the application of 1920, which is in evidence, and wherein the patent in suit is alleged to have been first described, there is nothing whatever to suggest the use of the small arc lamp, as a negative glow lamp, or as a luminous gas discharge device, as is now claimed. The source of light there is variously referred to in the application as a sound controlled light, a light emitting device, an electric lamp, an incandescent filament lamp, and an alternating current lamp; in my opinion, all this does not remotely describe a negative glow lamp, or a luminous gas discharge device.

Counsel for the defendant contended that certain circumstances disclosed in the evidence supported the view that the specification was not intended to describe what de Forest now claims to be his invention, and that he had not made his alleged invention when his specification of 1920 was prepared. While, in the result, this adds nothing to what I have already said, still it is of some importance, and might conveniently be mentioned here. It was pointed out that de Forest admitted, that in 1919, he had abandoned experiments with the incandescent filament lamp because it appeared to be of no value. Defendant's counsel argued from this, that inasmuch as de Forest had abandoned the incandescent filament lamp as a light source the year before his application for patent in Canada in 1920, and then in that application having mentioned the use of the small arc lamp with which we are here concerned as well as the incandescent filament lamp which had proven not to be useful, that he could not have experienced any useful results from either light, otherwise the application for patent would not have put both lamps on the same footing, and the application would have been confined to the lamp from which the patentee had obtained useful results. Again it was pointed out that in 1921 de Forest made application in the United States for a patent of another light source, which was not a negative glow light, but a positive column light, and which was intended to be used only with the positive column light. If de Forest had ascertained prior to October, 1920, that his small arc lamp functioned as a negative glow lamp because the electrodes were placed closely together, and could be successfully used for recording sound, it seemed rather incredible counsel argued, that

he should have applied in the United States in March, 1921, for a patent for a positive column lamp to be used for the purpose of recording sound, which lamp lacked utility for his purposes, and which positive column light he now claims to have invented means of avoiding in a glow lamp, prior to 1920. A Canadian patent issued to de Forest for the positive column light source just mentioned. Then defendant's counsel proceeded to argue that de Forest could not have invented a negative glow lamp in the year 1922, because he admitted having adopted in that year in his experimental work for photographically recording sound, a dumb-bell lamp, which has the positive column light, and with this light he gave in that year a demonstration to the press in Berlin. It was urged that it was inconceivable that one who had discovered in 1919 that the only useful lamp for his avowed purposes was a glow lamp showing only the negative glow, should in 1921 apply for a patent of a lamp to be used with the positive column, and in 1922 use another positive glow lamp, the dumb-bell lamp. It was claimed by Mr. Chauvin, counsel for the plaintiff that it was the cathode bulb of the dumb-bell lamp that was used or exposed before the film. Even if that be correct the dumb-bell lamp did have the positive column and was the kind of light that de Forest claims his small arc lamp altogether suppressed. The invention claimed in this case is a glow lamp that has the negative glow only and does not show the positive column. Then it was said that de Forest in the autumn of 1922 after returning to New York from Berlin with the dumb-bell lamp as the most advanced and practical lamp of which he had knowledge for the purposes in which we are interested, got into communication with Case, from whom he obtained a lamp operated with a negative glow and, it is claimed I think, that this was the first purely negative glow lamp that de Forest ever used in his experimental work. In 1923 de Forest used the Case lamp in a demonstration or sound motion pictures in New York. When de Forest and Case became estranged in their business relations, de Forest ceased using the Case lamp, and adopted the use of the Tri-Ergon lamp so called, controlled by European patents, which was a negative glow lamp, and which I under-

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stand is the lamp the plaintiff now uses. All these considerations I must say, strengthen my impression, that de Forest had not in 1919 or 1920 consummated an invention of the light source which he now claims to have then invented, and consequently he could not in 1920 properly or sufficiently describe it, but if he did then make the invention he failed to describe it in the manner the law requires.

But that is not all that lends weight to the contention that the specification is void for uncertainty. Referring to the diagram of the lamp shown in the drawings accompanying the application of October, 1920, and that of June, 1923, both being the same, it will be seen that the lamp is represented as spherical in shape. Two expert witnesses for the defence stated that usually in gas discharge devices used in recording sound, the electrodes are placed in a narrow or cylindrical tube, and as near the end as possible, so that the light source may be as near as possible to the film, whereas in the case of an arc discharge lamp it is usually necessary to keep the electrodes as far from the glass surface of the tube as possible, to avoid damage to the tube by overheating, in which case, a spherical tube might be very desirable. In fact, de Forest at first used a lamp of the shape appearing in the drawings but later he adopted a cylindrical shaped lamp, although he says this was owing to the fact that it was more convenient for the tube manufacturer to make the complete lamp in that form. I think it is a fact and it seems reasonable, that in a glow lamp, the glow should be as near as possible to the film or optical system, and it is equally reasonable that in the case of an arc discharge lamp, the arc stream should be some distance from the envelope. By itself I would not attach much importance to this point. Again expert witnesses have testified that the preferred use of "two heavy tungsten ball electrodes" indicates an arc discharge lamp which invariably produces high temperatures which the electrodes must withstand, whereas in a negative glow lamp, the electrodes do not become hot and there would be no advantage in using metal electrodes with a high melting point. Then it was urged that tungsten electrodes are not desirable in a glow discharge lamp, because the bombardment of the ions cause the tungsten to sputter; and that



the separation of the electrodes by the specified space of only one half a millimeter indicates the use of an arc discharge because it would require a smaller potential to break down the gap, whereas, in a glow lamp they might be separated from five to ten millimeters. In the case of the A.E.O. lamp, as presently used, it was stated that the separation was about eight millimeters, and such a separation had the advantage of tending to localize the glow between the electrodes rather than surrounding them, and de Forest admits he obtained better results from a separation of three or four millimeters, approximately the separation originally used in the Case lamp. The filter which is mentioned in the specification, it is admitted by de Forest, is of no use in a glow lamp, whereas according to some witnesses it might be of advantage in an arc discharge lamp in screening out undesirable rays, and also in modifying the intense light coming from such a lamp, which makes modulation indistinct. Dr. de Forest states in his specification that he had best results in recording sound by using a colour filter, preferably a dark blue filter. It was also suggested that because de Forest did not give fuller directions as to the gas or gases to be used, the pressure of gas and other particulars relating to the operation of a glow discharge lamp, that it was a reasonable inference that he must have intended the lamp to be used as an arc lamp or he would have given more precise information upon these points to the public. I think also that the fact that the patentee did not claim as his invention, "an enclosed luminous gas discharge device," until 1925, possibly earlier in the United States, is also a circumstance of weight against the plaintiff. There is no description of a light source in such terms in the specifications of 1920 and 1923. All this lends weight to the contention that the specification in question is obscure and ambiguous.

One point raised by the plaintiff may be mentioned here. It is claimed that a glow light must have been intended by de Forest because no means are provided for striking the arc lamp. Striking means for securing an arc discharge would not be necessary if the lamp were filled with gas. The evidence perhaps is not clear as to whether the arc could be struck if the lamp were evacuated. If the lamp were evacuated and striking means were necessary, then, it is as reasonable to say that this was an omission of the

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patentee, or that he thought it unnecessary to mention it because the necessity of it would be obvious to those competent in the art, as to say that the omission of striking means is an indication of a glow lamp. That is not I think a good answer to an ambiguous or defective specification.

It is agreed that the use of gas is imperative to make operable a negative glow lamp and that the plaintiff's lamp would not successfully operate if evacuated. The specification does not state that a gas filled lamp must be used to make the invention operable. The use of gas is only alternatively suggested. The specification states, "I employ a small arc lamp . . . , either evacuated or filled with some gas, such as nitrogen, mercury vapour, etc., to make the light from such arc as rich as possible in ultra violet rays." A glow lamp being one in which gas is illuminated by the passage of electricity between two electrodes, I find it difficult to believe, in view of this language, that the patentee really intended to describe and direct the use of a negative glow lamp, but at least I am certain that he has not sufficiently done so. To say that a lamp may be filled with gas is not to say that it is to be operated as a negative glow lamp. Assuming that "either evacuated," or "filled with some gas" does not imply complete evacuation, or that the tube should be completely filled with gas, yet these words, in my opinion, can only be read to mean that the lamp might be evacuated so that a residual air only remained and thus used,—and de Forest says he did so use it—or alternatively, that gas or gases might be introduced to improve the actinic qualities of the light. There is no ground for construing these words to mean, as was suggested, a direction that the tube was to be exhausted and then filled with gas, and again exhausted to secure that pressure of gas under which the lamp would function as a glow lamp. That would be straining the language of the specification to supply something either not described in the specification at all, or something ambiguously described. I have already quoted from the specification of 1920, the description of two light sources, one being a small incandescent filament lamp, the other a small arc lamp. The patentee had, I think, the same conception regarding both forms of lamp, that is, they might be used either evacuated or filled with gas. One of the reasons why he expressed a preference for the use of gas in the incan-

descent filament lamp was to improve the actinic qualities of the light, and that light was clearly not a glow light. For the same reason, and none other, he suggests the use of gas in a small arc lamp. There is no possible ground for the suggestion that the lamp was directed to be used exclusively as a glow lamp, and therefore always to be filled with gas, in fact the language of the specification directly negatives such a suggestion. The use of gas in an arc lamp does not constitute a description of a glow lamp, nor is it a direction to use a lamp as a glow lamp. Therefore, in my opinion the specification means and was intended to mean, that the small arc lamp might be used evacuated. If the lamp could not be used satisfactorily if evacuated, and this is agreed upon, then the specification is clearly bad, because it specifies two methods of using or operating the lamp, one of which is impracticable and useless for the purpose the patentee had in view.

The small separation of the electrodes is now emphasized as the real merit of the invention, and I have already quoted from the patentee's own evidence, and that of Dyer, showing that it is the provision of such means that is now claimed as the real merit of the invention. But if this was so, it was imperative, I think, that the patentee should have stated in very clear language that such was his invention, that he had invented a new and useful way of constructing a negative glow lamp, a well known source of light, so as to exclude altogether the presence of the positive glow, that is, by using electrodes separated by a small gap, in a gas filled lamp used as a glow lamp. And probably he should have claimed it as being something new in a combination of many old elements, although I am not so deciding. If it was clearly in the patentee's mind that he had invented a new and useful way of constructing a glow lamp which permitted only the negative glow and excluded the positive column, is it possible that he could have failed to have so stated the fact in his specification? I do not think that such a thing is conceivable. Had that been done it might at once have identified the lamp as a negative glow lamp, and its construction would perhaps have been sufficiently described. A specific separation of the electrodes is mentioned of course, but no particular quality or value is ascribed to that separation, and there is a complete absence of any claim to invention in the separation of the

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electrodes, in any of the claims. The selection of a separation of the electrodes by one half a millimeter is in itself not decisively suggestive of an intention to use a negative glow lamp, rather it would seem to restrict unnecessarily the natural area of the glow, particularly I think when one takes into consideration the dark space surrounding the cathode. In fact, de Forest later used a wider separation which he said was more preferable. Furthermore, the electrode separation specified would be equally satisfactory, if not more so, for the use of the lamp as an arc discharge lamp. If the spirit of the invention lay in placing the electrodes closely together for the purpose of securing the negative glow only, and eliminating the positive column, then I say that the specification is singularly deficient in pointing out what was the real invention for which a monopoly was claimed. It is begging the question to say as did Dyer, that when de Forest showed a glow light it was obvious that he intended that the lamp was to be operated with a cathode glow. I do not think de Forest did, to use the words of Dyer, show a glow light or a cathode glow.

It is common ground that the plaintiff's lamp, if filled with gas, might be operated either as an arc discharge lamp or as a glow lamp, depending upon the pressure of gas and voltage. This was admitted by de Forest, and he stated that the pressure favourable for an arc discharge was two-thirds of an atmosphere, whereas for a glow it was about five or six one-thousandths of an atmosphere. That fact makes this case an unusual one, but it does not alter the requirements of the law, as to the description of an invention. If the specification describes a tube which will function successfully as a negative glow lamp if certain gases are used and a certain pressure of gas is employed, as an arc lamp if another pressure of gas is used, and not at all if no gas is used, and there are no specific directions as to the appropriate gases to be used or the approximate pressure of gas to be employed, in order that the lamp might function successfully as a glow lamp, then I think the specification is again bad. And particularly would this be so where the light source is described as an arc lamp, and where there are no directions to use exclusively a gas filled lamp. If the matter of gas pressure or voltage is a condition for the successful operation of the plaintiff's lamp as a negative glow lamp, that pressure should be described

and stated, at least in general terms, if the light source is not mentioned and described as a negative glow light. All that is left to others to ascertain. As the specification now stands, any person attempting to construct and operate the plaintiff's lamp would, in my opinion, require to do a very considerable amount of experimental work. In the first place, he would probably experiment with the lamp not filled with gas, and would fail it is agreed. He then would experiment with a gas filled lamp, and he has not very definite instructions what gas or mixture of gases to use, because the inventor has not given the results of his experiments with gases, he not only does not express a preference for any gas or gases, but states his directions as to the use of gas in a very casual and general way. One gas seems to have the same value as another, and there is no suggestion as to a mixture of gases. He would have to ascertain the proper gas or mixture of gases by experimental work. Then in his experimental work he would be as liable to get an arc discharge light as a negative glow light, having no directions as to gas pressure, and if he got an arc discharge which he probably would if he followed the method of filling the lamp described by de Forest, he would have no reason for not believing that that was the light the patentee described in his invention; and if he got a negative glow light there would be no reason for his feeling confident that that was the source of light the patentee had in mind. The maker of the lamp is not the person who photographs sound upon a film, variable area and variable density is a closed book to him and the specification and claims say nothing about it, and therefore these factors could not assist him in constructing the patentee's lamp. Had the specification stated a negative glow light was to be used, and had explained the purpose the patentee had in mind respecting the spacing of the electrodes, the one doing the experimental work, if a person having knowledge of the phenomena resulting from the passage of electricity through gases and how affected by varying gas pressure, voltages, etc., might succeed with but a reasonable amount of experimental work. But as the specification stands, the person to whom the specification is addressed, seeking to construct the plaintiff's lamp, without any other aid or knowledge, would require to have all the knowledge and inventive skill of the patentee. It is no answer to say that any competent

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person would know that the patentee meant the use of a glow lamp, the use of the cathode glow, and should know what pressure of gas and what voltage should be used to obtain either an arc discharge or a glow discharge. I do not think he would or should be expected to know so much. That in my opinion is not the qualification which a skilled workman, called upon to construct the invention from the specification, is supposed to possess. That would put the skilled tube maker on the same plane as the inventor. The scientifically trained man in this particular art with a slight hint might possibly construct a negative glow lamp, but if he did so, it would be because of his own skill, knowledge and experimental work, and not because the specification taught him how to do it. But in my opinion the specification is not addressed to that class of persons. Uncertainties and deficiencies in a specification cannot be amended or explained away years afterwards at a trial, that is too late. The law requires that to be done unequivocally in the specification. The plaintiff's lamp therefore being capable of being used either as a glow lamp, or as an arc discharge lamp, according to the pressure of gas and other conditions, and the patentee not having directed the exclusive use of the lamp as a glow lamp, and not having explained that an arc discharge light was unsuitable and how it could be avoided, this, I think, renders the specification bad. The persons to whom the specification is addressed are not expected to possess that skill and knowledge, or to perform that amount of experimental work, which would enable them to ascertain the one source of light which would be suitable for the purpose of recording sound upon a film, which is the alleged invention, or to ascertain that the other light was unsuitable for the same purpose.

The validity of the plaintiff's patent is also challenged upon the ground that the language of all the claims relied upon are so wide as to include any enclosed luminous gas discharge device, that is, any lamp in which there is a luminosity produced by an electric current passing through gas, and that the claims thus so broadly stated include and describe devices that are old and are therefore bad. I have already quoted one of the four claims relied upon, and there is really no distinction between them. Assuming that de Forest had invented a negative glow lamp, an enclosed luminous gas discharge device, just as he described it in

his evidence, are the claims relied upon valid? De Forest stated in evidence that glow tubes of various sorts were very old. There can be no doubt but that the mercury arc lamp, or more properly speaking the mercury vapour lamp, usually referred to as Aron's lamp at the trial, a positive column light, is a luminous gas discharge device; this was in express terms admitted by Dyer, one of the plaintiff's expert witnesses. This lamp, and there are many of the type, was used and known prior to any date referable to the alleged invention of the plaintiff's patentee, and in connection with the recording of sound upon a film. Then there is the Gehrcke tube, a negative glow lamp, which may also be properly described as a luminous gas discharge device. It was urged that the area of the glow in the Gehrcke tube varied, that is to say, that as the current fluctuated the lateral length of the negative glow contracted or extended, while the glow in the plaintiff's lamp does not so vary; but that did not make it any the less an enclosed luminous gas device, and the claims do not distinguish between the lateral extension of the negative glow and the intensity variation of the glow. Ruhmer and Lauste, when working together prior to the date of the plaintiff's alleged invention, had used a two electrode gas filled tube made by Ruhmer, and a luminous discharge passed between the electrodes. Dr. Tykociner had used long before de Forest a Geissler tube as a glow discharge tube, and he also used the Von Lieben tube, a gas discharge tube of the thermionic type, and described in the patent to Von Lieben, Ries and Strauss; these two light sources were gas discharge lamps, and would fall within the description of "an enclosed luminous gas discharge device." In the Stocks patent, a United States patent, which was prior in date to de Forest, the light source is described as preferably a mercury vapour lamp, the record on the film when developed being one of variable density; the source of light described in this patent also falls within the ambit of the plaintiff's wide claims. Then there is the Swiss patent, issued to Vogt, Engl and Massole, the object of which was to record sound frequencies upon a film. The application for this patent was made in Switzerland in March, 1921, and the priority date of March, 1919, was claimed, based upon an application made in Germany on that date. In this patent the source of light is described as being "preferably a luminous

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gas discharge, for example, a mercury vapour lamp or any other gaseous tube with a luminous discharge." It is not necessary to make further reference to the prior art, or to prior user, upon this point. The claims of the patent cover a positive column light as well as a negative glow light, in fact any luminous gas discharge device. It appears to me therefore that de Forest, in his claims, does not distinguish between what is old and what is new. His wide claims to "an enclosed luminous gas discharge device," for the purpose of recording sound photographically upon a film, includes, in my opinion, old and well known devices falling within such claims; in other words, there has been anticipation. The claims are so wide as to include any conceivable kind of a gas discharge lamp, whereas the patentee alleges that all he invented was a new and useful negative glow lamp. Upon this ground I think the claims relied upon are bad. They are of course also bad because they include something that is not described in the specification.

By reason of the conclusions which I have already expressed, it is not necessary that I should express any opinion upon any of the remaining defences raised by the defendant at the trial, because it follows from what I have stated, that the plaintiff's action for infringement in respect of this patent must fail.

The second patent, which is alleged to be infringed by the defendant, is patent No. 279,863. This patent was applied for in April, 1923, by Lee de Forest, and issued on May 1, 1925, and is described as "Talking Moving Picture Attachments." The specification states that the invention consists of "substantially the construction, combination, location and relative arrangement of parts." Again the patentee explaining his invention in his specification states:—

It will be seen from the foregoing that I have provided an exceedingly simple and efficient arrangement for combining sound photography with motion picture photography as practiced with the present types of motion picture projectors or cameras and one which makes it possible to convert standard projectors or cameras into talking moving picture projectors or cameras at minimum expense and with minimum alteration, and at the same time permitting the normal operation of the operation or projector when desired for either purpose, without interference by the attachment while at the same time having the attachment at all times available for combined operations where desired.



There are altogether fourteen claims, the first seven of which describe the alleged invention as a combination comprising a motion picture machine, a film magazine and an intermittent feed sprocket, a light controlled sound reproducing apparatus positioned between the magazine and the sprocket, and means for controlling the speed of travel of the film through the apparatus. That describes, if I am not mistaken, a complete and unified sound and picture projecting device. The remaining claims relate to a sound picture attachment for motion picture machines, comprising a casing provided with a film path passing through it and separating the casing into chambers, aligned slits forming part of the film path, and means for causing the film to pass between the aligned slits under tension. What the last seven claims describe as an attachment, is the same thing as the specification describes as an arrangement for combining sound photography with motion picture photography, and what the first seven claims describe as a light controlled sound reproducing apparatus. I doubt whether the word "attachment" as used in the specification and claims is appropriate.

In reproducing sound that has been photographically recorded upon a film, back into the original sound waves impressed upon the microphone, and in projecting the same upon the screen, a certain mechanism or apparatus is required, consisting of a lamp or light source, lenses, a film path, film magazines, an intermittent feed sprocket, a photo-electric cell, etc.—it is not necessary to describe all this in detail—and that combination or apparatus for reproducing sound recorded upon a film was referred to throughout the trial as "a sound head." The patent claims refer to it as "a sound picture attachment," and it is the thing which at the trial was claimed as the invention and said to be infringed. The apparatus which projects a picture upon the screen is usually called a motion picture projecting machine, and this machine during the course of the trial was usually designated as "a picture head." It will probably be convenient for me to continue the use of these terms as meaning respectively the sound reproducing mechanism, and the motion picture projecting mechanism. By combining the picture head and the sound head, and by the introduction into the combination of a film magazine, an intermittent feed sprocket and

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a picture and sound film, it is possible to combine sound photography with motion picture photography, so that sound and picture may synchronize and be projected together upon the screen. It is claimed that de Forest first conceived the idea of putting the elements forming the sound head into a separate attachment, or unit, so that it might be applied to a standard picture head; that is what is claimed to constitute the invention in this patent.

The plaintiff's sound picture attachment is itself a combination of many elements, and speaking generally at least they were old and well known. The statute requires that in the claims the patentee shall state distinctly what it is he claims as new. In this case, it appears to me, no claim was distinctly and definitely made to invention in respect of any one or more of the elements of the sound head or attachment. However, at the trial it was claimed that there was invention in the sound film gate, one of the elements in the attachment or sound head combination, and that point may first be considered. In a combination patent particularly, if invention is claimed for any integer in the combination it must be described and claimed as new, and clearly claimed; otherwise the invention can only be in the combination, if at all. I very much doubt if this has been done or that the law in this respect has been complied with but it is not necessary that I should express a definite opinion upon the point. As I have just stated, it was contended at the trial, that invention was to be found in the particular construction of the film gate or path, that is to say, the patentee claims that he has invented new and useful means for guiding and pressing the film close to the light slit, a small aperture through which light is emitted upon the film as it passes on its way from the film magazine,—and the film must of necessity pass in front of the light aperture—thus preventing any lateral movement of the film, which would be fatal, as it rapidly passes in front of the light aperture. This film gate, it is claimed, does not interfere in any way with the speed of the film or with the rest of the mechanism. I do not think there is any invention whatever in the construction of what is called the film gate. The film must pass in front of the light aperture, and rapidly. It is quite obvious that as the film passes the light aperture its speed must not be impeded, it must be under tension, there must be no move-

ment of the film except the onward movement, and it must be kept in close contact with the light aperture. Some means is probably desirable and necessary at this point, to guide and control the film with unfailing fidelity in its predetermined motion and position, as it passes in front of the light aperture. The provision which the plaintiff's patentee makes in this regard, and which it is now claimed constitutes invention, might obviously be done in a score of slightly different ways, but I do not see room for invention in selecting one way over another. I very much doubt if there could be invention in any conceivable means that might be adopted to perform this function. Something, I should say, was necessary to guide the film and press it against the light aperture. If it was not necessary to do this at all, then that would be the end of this issue. Prior patents refer to means of the same nature for performing the same function. Possibly it was not even necessary for a patentee to say in his specification how this should be done, although it might be proper to say that it should be done if found necessary. It would occur to anybody, I should think, that some device should be employed to conduct the film past the light aperture rigidly and so as to ensure only a forward movement. I should think that any competent workman asked to construct some means of performing the function of the plaintiff's film gate would do so without difficulty.

To combine a sound head and a picture head, so that each would function in the combination so as to produce sound and picture upon a screen was not new. This was described in prior patents, for instance, those issued to Bullis and Ries in the United States, but, it is said, they were described as being structurally united and could not be readily separated. Assuming then that the prior art shows a sound head and a picture head in combination with the other essential elements in a sound and picture projection device, but structurally so united as to constitute one unit, is there invention in the construction of the sound head as a single unit with provision for attaching it to a standard motion picture projecting machine or picture head? The sound head and the picture head, and all the other integers in the combination, each perform the same function however they are united, whether the sound head and picture head are constructed as two units and then

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made one by attaching them together in some way, or whether they are so assembled together in the first instance that they cannot easily be separated. The invention claimed at the trial was not in combining a sound head and a picture head so that they might function as a sound motion picture machine, that in my opinion was old in any event, although the first seven claims would seem to claim that as the invention. The invention claimed at the trial was in constructing the sound head as a single unit, for the sake of convenience and cost, it was said, so that it might readily be attached to a picture head. I do not think that constitutes invention, and at the same time I might also say that I do not think that invention is to be assumed or established because the sound head is positioned either above or below the picture head. I do not mean to say that in combining together a sound head and a picture head, along with the other necessary elements, so as to project sound and picture simultaneously and in synchronism upon the screen, did not when first made public produce a new and useful result, but that is not this case. The combination of sound and picture heads projecting sound and picture was not new, that as I have already said had been described in the prior art, but the claim is that in such prior art the sound and picture heads were structurally tied together, whereas in de Forest the sound head is a unit by itself and designed to be easily attached to or detached from a picture head. If the heads are built as units, it would be necessary to unite them by some means before they could in combination produce the desired result. The process of uniting the sound and picture heads so as to function in combination, so far as I can see, is practically the same, whether they are originally constructed as units and then united, or whether they are in the first instance united; in the first instance a different arrangement of some of the parts might be necessary. The sound head and picture heads are, I think, two separate things to start with, and for the purposes in which we are interested, they must be united so as to work in combination. When that is known I do not think there is invention if one decides to take a standard picture head and unite it with a sound head, that in reality was what would be done had they been structurally united at the start. I do not think that the plaintiff's attachment

advances the prior art sufficiently forward as to justify one in saying that there is invention.

Let us assume however that there was room for invention in constructing a sound head as a single unit. Bullis in his specification states that "the mechanism for moving the films and projecting the pictures may be of the conventional construction". I have no doubt whatever that Bullis had in mind and meant by these words to say, that the standard motion picture machine might be used and that a sound head could be attached to or united with it to function in combination. Considering that the motion picture projecting machine long preceded the introduction of sound motion pictures, it is more than probable that the mind of any person interested in the development of the art of sound and picture projection in synchronism would at once turn to the conventional picture projecting machine as a start. The reproducing sound apparatus described and used by Tykociner in 1922 was designed for either a Simplex or a Pathé projecting machine, which were types of projecting machines then used in motion picture theatres. Lauste in his work used a Pathé projecting machine. So if the plaintiff's alleged invention be regarded as a mere attachment, a sound head constructed as a unit to be attached to a picture head, the idea was not a new one, and had been anticipated. It was not contended that the plaintiff's attachment was so much better than any other prior and known attachment, that the improvement constituted invention; the case was not put on that footing, it was claimed that the plaintiff's single unit attachment was the first to be invented.

I am therefore of the opinion that the plaintiff fails in its action for infringement in respect of this patent, as well as in the other, and costs will follow the event.

*Judgment accordingly.*

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